Gender differences, environmental pressures, tumor characteristics, and mortality rate in a cohort of colorectal cancer patients: a Bayesian survival analysis with 8-year follow-up using data from the Taranto Cancer Registry

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Abstract

Introduction

In 2020, colorectal cancer accounted for 10% of worldwide cancer incidence and 9.4% of cancer deaths. Approximately 4.4% of men (1 in 23) and 4.1% of women (1 in 25) will be diagnosed with CRC in their lifetime and and its incidence is expected to increase by almost 80% by 2030 [1].
Genetic susceptibility, poor diet, the microbiota and immune response, as well as environmental factors are thought to influence the natural history of this disease [2].

Aims

The aim of this study was to investigate the relationships between gender, residence in areas with high environmental pressure, pathological/clinical staging (TNM I to IV), histological grading (Grade 1 to 3) of the lesion, and all-cause mortality rate.

Methods

Data from the Taranto Cancer Registry were used, including all patients aged 40 years and over, residing in the province of Taranto diagnosed with invasive colorectal cancer (C18-C20) between 2015 and 2020 and followed-up to 2023. The analyses were conducted with Bayesian mixed Cox and logistic effects models constructed via the Integrated Nested Laplace Approximations approach, adjusting for different patient and tumour characteristics.

Results

A total of 7520 person-years were followed up for the selected cohort. Variables significantly associated with a higher mortality rate are male gender (HR 1.13, 95% CrI 1.00-1.28), TNM III (HR 1.62, 95% CrI 1.24-2.11) and IV (HR 4.76, 95% CrI 3.73-6.08) and histological grade 3 (HR 1.76, 95% CrI 1.50-2.07); the variable significantly associated with a lower mortality rate was diagnosis of cancer with rectal localization (HR 0.79, 95% CrI 0.66-0.95). Male gender resulted significantly associated with left colon localization of the lesion (OR 1.28, 95%CrI 1.03-1.59), while residence in the municipality of Taranto and Statte (SIN, Contaminated Sites of National Interest) was associated with reduced rectal localization (OR 0.7, 95%CrI 0.56-0.88).

Conclusions

The presented results of our study confirmed that TNM staging and histological grading are independent prognostic factors for all-cause mortality rate in patients with invasive colorectal cancer. Patients residing in the SIN do not show a significantly different mortality rate from that of residents in other municipalities, while they show a lower proportion of subjects with rectal cancer compared to colon lesions. Interestingly, there is a better prognosis in patients with rectal adenocarcinoma (C20) than colon neoplasia (C18) and a worse prognosis in male patients, displaying among other things, a greater probability of left laterality.

Our efforts will be aimed at updating the study by recovering further, individual-level data about environmental exposures (distance from polluting sources, exposure to airborne pollutants through dispersion models, questionnaires, biomonitoring), socio-economic factors (updating indicators of deprivation at census tract), access to secondary prevention programs (screening path through colonoscopy) and diagnostic-therapeutic-surgical paths (timing, place and type of interventions).

Bibliography

1. Morgan E, Arnold M, Gini A, et al.The global burden of colorectal cancer in 2020 and 2040: incidence and mortality estimates from GLOBOCAN *Gut*, 2022 Sept; 72(2) online http://dx.doi.org/10.1136/gutjnl-2022-327736.

2. Keum N, Giovannucci E. Global burden of colorectal cancer: emerging trends, risk factors and prevention strategies. Nat Rev Gastroenterol Hepatol. 2019 Dec;16(12):713-732.